The Canadian Entomologist.

LXXV SEPTEMBER, 1943 No. 9

DESCRIPTION AND BIOLOGICAL NOTES ON A NEW SATURNIID OF THE GENUS *PSEUDOHAZIS* FROM THE BIG BEND REGION OF TEXAS

BY E. R. TINKHAM,

Phoenix, Arizona

This is one of a series* of papers on the desert life of the Big Bend Region of Trans-Pecos, Texas. The area concerned is mainly in Presidio and Jeff Davis Counties; the former one of the largest counties in the United States. Situated about twenty miles north of Presidio in Presidio County is the mining town of Shafter which lies in the heart of the Chinati Mountains. The Chinatis are desert mountains and were practically uncollected prior to the period 1928-1930 when the writer worked this region. At this time the writer wishes to present the description of a remarkable new species of the saturniid genus *Pseudohazis* collected in the Chinati Mountains and to record what biological notes are known about this interesting new species.

The writer has studied all the known species of the genera *Pseudohazis* and *Hemileuca,* many of which are in his collection. To Mr. O. C. Poling, Dr. J. McDunnough and Dr. J. F. Gates Clarke, thanks are due for having expressed their opinion in the past as to the validity of this new species. Dr. Clarke has examined the genitalia, a slide of which is in the United States National Museum.

Pseudohazis chinatiensis n. sp.

Most closely resembled by *P. hera hera* (Harris) from territories east of the Sierra Nevadas of California, but upon closer scrutiny this similarity does not extend proximad the submarginal band of the primaries. The male genitalia are vastly different in the two species; at present this new species has no known close relative.

Type: Shafter, Chinati Mts., Presidio Co., Texas, Sept. 16, 1929 (E. R. Tinkham). Length: primaries expanded, 2.45 inches, secondaries 2.15 inches. Type in the author's collection.

Head: eyes dark brown; clypeal hairs dark verona brown, centrally with intermixed pale brown hairs. Epicranial hairs rust red. Antennae doubly pectinate, black, the pectiniform processes finely plumose.

Thorax: above clothed with black pilosity and a scattering of long white hairs, with tufts of rust red hairs at the base of the secondaries and on the mid anterior portions of the mesothorax. Collar lappet white; patagia black, with long white hairs. Pectus largely brownish black, with tufts of white and red hairs at the base of the primaries. Legs clothed with jet black hairs, the femora, especially those of the fore legs, with long reddish brown hairs.

Abdomen: black, heavily vested with reddish brown pilosity, below black with a slight admixture of whitish hairs along the median ventral areas and the posterior margin of each abdominal segment.

Primaries: lustrous black in newly emerged individuals, dulling in old and worn specimens. Submarginal row of white markings large and narrowly subconical in shape. Apical two-thirds of disc occupied by a large, white, subquadrate, orbicular patch of white. The basal line occupies the proximal costal areas, incurving at the basal portions of the disc to run transversely to the hind margin. A subtriangular patch lies distad the disc between the discal patch and

*1934, Can. Ent., 66:213-218 (the dragonfly fauna); 1935, Can. Ent., 67:207-211 (Mutillidae); 1938, Jour. New York Ent. Soc., 46:339-353 (Orthoptera attracted to light).

B & Z Library

the submarginal band, and an oval patch lies cephalad in the cell above. There is also a large patch and two narrow dashes of white below or caudad the large discal patch. Below, the primaries are similar to the upper surface, but the two dashes of white caudad the discal area are obsolete.

Secondaries: lustrous black, with the submarginal band of white patches smaller than those on the primaries. Disc occupied by a large white area, with traces of white areas cephalad and caudad the discal patch. Proximal areas and the inner margin pilose with long black and white hairs. Undersurface of the secondaries similar to the uppersurface.

Genitalia: the two drawings depict the differences in the genitalia of *P. chinatiensis* (fig. 2) and its congener *P. hera hera* (fig. 1) which of all the species of *Pseudohazis* comes closest to resembling it. The genitalia of *hera* are shining piceous, those of *chinatiensis* reddish brown with only the apex of the uncus black. In *hera* the uncus is large and narrowly triangular, with a minute uncinate apex and two lateral uncinate processes at a distance below. In *chinatiensis* the uncus is shorter and broadly triangular, with the apex strongly triuncinate; the individual teeth heavy and long. The vinculum is broader and shorter in *hera* and the coxopodital area more openly bowed out; the harpes

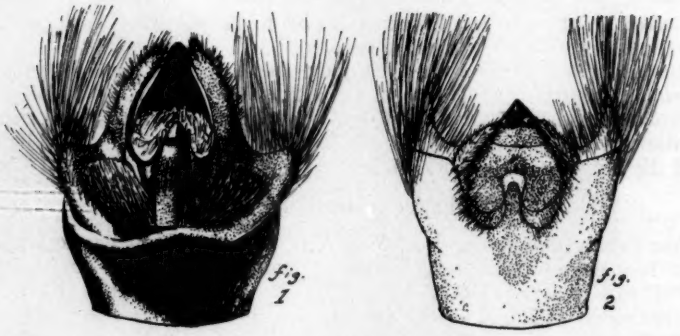


Fig. 1, male genitalia of *Pseudohazis hera hera* (Harris), from Mono Lake, California. Fig. 2, genitalia of type of *P. chinatiensis* n. sp.

forcipate and long and extending to the apex of the uncus. The external surface of the harpes is clothed with short and the coxopodital area with very long golden hairs. In *chinatiensis* the vinculum is more cylindrical, narrow, and closed with an emarginated ventral area bearing a median spathulate process; the coxopodital areas are short and entirely hidden by a dense vestiture of long reddish brown hairs, and the harpes are two forcipate processes, with short reddish hairs, lying within the vinculum but fused on their dorsal side with the coxopodite. The aedeagus of *hera* is a large laneolate process with a spathulate tip hiding a shining bifurcate process above which is part of the vinculum. The aedeagus in *chinatiensis* is cuniform, with a truncate apex, and is hidden above the spathulate process of the vinculum as seen in figure 2.

Allotype, ♀, same data as the type but collected Sept. 30, 1929. Length: primaries expanded, 2.30 inches; secondaries 2 inches; in the author's collection. Primaries and secondaries with markings similar to those of the type, but the ground color of less intensely black. Head with clypeal hairs more rust red than in the type. Antennae much less strongly pectinate, the pectiniform processes much shorter and not finely plumose as in the male. Collar rust red and not white as in the type; the dorsum of the thorax less densely clothed with hairs, and the sides of the metathorax with tufts of rust red hairs. Pectus brownish red, sparsely clothed with blackish hairs. Legs as in the type. Abdomen

black, the dorsum with the posterior margins of the segments fringed with rust-red hairs; the anal segment completely vested with long reddish brown hairs. Below the abdomen is almost wholly black.

Paratypes: 20 ♂, 2 ♀, same data as the type; collected between Sept. 16 and Sept. 30, 1929. Paratypes similar to the types. Measurements of male paratypes range from 2.25-2.95 inches and of the female paratypes from 2.55-2.85 inches.

BIOLOGICAL NOTES

This new species, in so far as is known, is found only in the Chinati Mountains of southwestern Texas, although it undoubtedly occurs in the nearby Bofecillos and perhaps in the Chisos and Mexican ranges such as the San Carlos, extending south into Chihuahua, and in all members of the same mountain system. The species does not range north of the Chinati Mountains onto the Marfa grasslands nor does it range south of the Chinati onto the creosote covered mesa of the Rio Grande Valley. It thus appears to be definitely restricted to the Chinatis where it occupies the lower portions of the range in an altitudinal zone extending approximately from 3500 to 5500 feet. The dominant plants of this zone are: sotol (*Dasylirion texanam*), lechugiulla (*Agave lechuguilla*), Spanish dagger (*Yucca macrocarpa*), catclaw (*Acacia greggi*) and several other shrubs and grasses. *P. chinatiensis* is undoubtedly a member of a Mexican Lower

Fig. 3, type, fig. 4, allotype, *Pseudohazis chinatiensis* n. sp. Fig. 5, male of *P. hera hera* (Harris) from Mono Lake, California.

Sonoran Fauna that reaches its northern limit of distribution in the Chinati Mountains, and possibly the Chisos Mountains of Brewster County. This same fauna has already been demonstrated by the writer in his studies on the Orthoptera, Odonata, and Mutillidae of the region.

The emergence of the moths takes place during the rainy season and during the verdure of the desert flora which is at its height in normal years at about the end of September, although this is not true of drouth years such as 1931. Their appearance coincides with the abundance of butterflies, and at this time large numbers, especially of the genus *Melitaea*, sport around in the flowery desert paradise. The moths are diurnal and begin their daily flight at about nine o'cock and reach their maximum activity an hour or so later when the temperature ranges 78-82 degrees Fahrenheit. They are very active, skimming and darting over the bare, jagged, limestone rocks and patches of dagger-pointed lechuguilla. They are wary and exceedingly difficult to catch, and their capture is frought with danger due to the rough terrain and the poisonous tips of the lechuguilla. Fortunately at noon or later, the moths as if tired from their tempestuous morning exercise, take to rest and in the afternoon are found clinging to the various desert shrubs, especially *Acacia greggi* and sometimes lechuguilla. At this time they are easily taken into the cyanide jar. In this fashion a considerable series, those reported here, were taken.

The eggs are laid in a fashion typical of members of the genera *Hemileuca* and *Pseudohazis*, i. e., in a broad, cylindrical band about half an inch wide around the stem of *Acacia* and perhaps other plants. The ova are large and white and somewhat flattened, with the tough chorion typical of the Saturniidae. Ova collected in October hatched into tiny, black, spiny caterpillars about the middle of the following April, but whether this is true in nature is not known. In March the writer has collected mature larvae of this species on a curious desert shrub known as *Foresteria angustifolia*. It is not known whether these mature larvae, about two inches long, were one year old or had grown to this size since the previous fall. More likely they were one year old and would pupate in April and emerge as adults the following September, thus completing a two year cycle. The larvae are dark gray with blackish spines. There is a conspicuous whitish lateral line and traces of a fine and partially broken dorso-lateral line. In other respects the larvae are typical of the genus.

A MECHANICAL ASPIRATOR FOR SORTING AND COUNTING INSECTS IN THE FIELD

A quick, easy method of transferring large numbers of living grasshoppers from collection cages to field cages was developed from the suction collector idea* by the writer during 1940. The vacuum created in the intake manifold of a car engine was used to operate an aspirator such as is in general use for picking up living insects.

The aspirator consisted of a glass storage tube, 6 inches long and 1 1/8 inches in diameter, fitted with single bore rubber stoppers. At the intake end, a glass tube, 6 inches long and of 7 to 12 mm. bore, was inserted through the rubber stopper so as to project about 1 1/2 inches into the storage chamber. In the opposite end a glass tube, 3 inches long and 7 to 8 mm. in bore, was inserted until flush with the inside of the stopper. A piece of 40-mesh wire screen was fastened over the opening of this tube to prevent dirt from getting into the manifold. High pressure developing over this small area was found to pull the grasshoppers violently against the screen and to injure them. This was prevented by placing a narrow cork collar, with another screen of larger area, at this end of the tube. The aspirator was attached to the windshield wiper connection on the manifold by means of a rubber tube.

In use, grasshoppers were swept up and placed in collection cages from which 8 to 10 grasshoppers were sucked into the tube. While these were being recounted, checked to species, and placed in field cages, another aspirator was filled. In this way three men, one using the aspirator and two sweeping, counting, and placing the insects in cages, can handle about 1,000 grasshoppers per hour with little or no increase in mortality of the controls in experimental work. This mechanical aspirator has proved indispensable during three years of Manitoba and Saskatchewan co-operative bait experimentation.

H. W. Moore,
Brandon, Man.

---

*Peterson, Alvah, A Manual of Entomological Equipment and Methods, Parts I and II, 1937.

NEW GENERA OF NORTH AMERICAN MUSCOID DIPTERA*

BY H. J. REINHARD,
College Station, Texas.

The following descriptions of five new genera and species of Tachinidae are based upon material received from several sources as indicated below. Most of the species have been standing in my collection for a number of years pending the accumulation of longer series. My thanks are due A. R. Brooks for the loan of some additional material recently discovered in the extensive tachinid collections in the Canadian Department of Agriculture. The type or paratype specimens, of the two species represented by this material, are returned for deposit in the Canadian Collection, as detailed under the descriptions.

Gremlinotrophus n. gen.

A small cinereous species with rather small roundish eyes, wide cheeks, parafacials and front; abdomen with discals; first posterior cell closed, usually petiolate, ending slightly before extreme wing tip. Belongs in Actiini, but readily distinguished from other members of the tribe by the items mentioned and additional characters listed below.

Female. Head distinctly wider than high, frontal profile flat, moderately sloped and but little shorter than receding facial; vibrissal axis about two-thirds antennal which is slightly below eye middle; face moderately impressed and weakly divergent downward, its lateral ridges with bristly hairs on lower two-fifths; epistoma short, as wide as clypeus and but slightly bowed forward from plane of same; vibrissae long, decussate at tips, on oral margin; frontals in a single row well removed from margin of frontal vitta, lowermost two or three bristles divergent and beneath antennal base; orbitals two pairs proclinate, one reclinate; inner verticals rather long, suberect, outer pair much weaker and curved outwardly; ocellar bristles widely divaricate, proclinate; antennae rather slender, reaching lower third of face, first segment short, third fully three times length of second; arista bare, shorter than antennae, proximal segments short but distinct; parafacial bare except a few scattered inconspicuous hairs on inner margin above, equal to or slightly exceeding clypeal width; eyes bare, extending to level with about middle of third antennal segment; cheek equal eye height, bare excepting a few hairs along lower edge; proboscis short, moderately stout; palpi subequal length of haustellum, slender with extreme tip somewhat thickened. Thoracic chaetotaxy: acrostichal 2, 3 (none immediately before suture); dorsocentral 2, 3; humeral 2; posthumeral 1; notopleural 2; presutural 1 (outer); intraalar 3; supraalar 3; postalar 2; intrapostalar differentiated; sternopleural 2, 1; pteropleural 1 (smaller than sternopleural); hypopleural 3-5; scutellum with 3 lateral, 1 discal and 1 hairlike apical pair, latter not decussate; prosternum setose; propleura and sides of postnotum beneath calypters bare; infrascutellum normally developed; hind lobe of calypters about as wide as long. Abdomen ovate, about as wide as thorax; basal segments each with one pair of median marginal bristles set well before hind margin, third and fourth with row of marginals besides submarginals and a discal row on last; genitalia without piercer; sternites covered. Legs moderately long; hind tibia not ciliated; claws and pulvilli short. Wings normal in shape, extending beyond tip of abdomen; first vein bare, third with two or three hairs near base; hind cross vein about midway between small cross vein and bend, latter usually without stump or fold; costal spine rather long but not stout.

Genotype: *Gremlinotrophus derisus* n. sp.

Gremlinotrophus derisus n. sp.

Female. Front at vertex 0.49 of head width (average of four specimens), widening gradually downward to antennal base; parafrontals and parafacials with thick dull cinereous pollen which becomes thinner on cheeks, latter reddish

*Contribution No. 772, Division of Entomology, Texas Agricultural Experiment Station.

to black in ground color; frontal vitta reddish brown to black, widening slightly toward vertex, at middle wider than parafrontal; antennae black with a reddish tinge in ground color of second segment; arista black, moderately thickened on basal two-fifths; palpi dark brown or blackish; back of head slightly convex, cinereous pollinose and clothed with rather sparse short black hairs above and pale ones below.

Thorax and scutellum black, with moderately dense cinereous pollen, four dorsal vittae poorly defined before suture and obsolete behind; calypters white.

Abdomen black, last three segments with brassy tinged gray pollen extending thinly to hind margin except on last without definite pattern, venter wholly gray; discals on third segment variable, sometimes doubled or in an irregular transverse row; genitalia terminating in a thin or laterally compressed organ which is not adapted for piercing.

Legs black, moderately slender; middle tibia with two stoutish bristles on outer front side near middle.

Wings subhyaline; first posterior cell variable, closed and moderately long petiolate in two specimens (including type) and barely closed at costa in the two remaining specimens; bend of fourth vein broadly rounded; small cross vein slightly before apex of first; epaulets infuscated, subepaulets pale reddish.

Length, 5-6 mm.

Holotype: female, Amherst, Ohio, July 9, 1934 (H. J. Reinhard). *Paratypes*, three females in Canadian National Collection as follows: one, Bozeman, Montana, June 10, 1906; two, Alberta, Canada, June 1 and 7, 1923 (H. L. Seamans).

The differences in coloration and wing venation noted above may indicate the presence of more than a single species in the material included here. The latter, excepting type, is not too well preserved and since greatest variation occurs between two specimens collected in the same general locality, it appears expedient to consider the series as conspecific for the present.

Lispideosoma n. gen.

Allied to *Lispidea*, but considerably more robust in build and the narrow parafacials setose on entire length. Also close to *Plectopsis*, but at once distinguished by the bare propleura and narrower parafacials.

Head nearly one-third wider than high, frontal profile distinctly shorter than receding concave facial, vibrissal axis about three-fourths antennal, which is well above eye middle; face broad, hardly at all impressed, its ridges bare, flattened and much wider than parafacial; epistoma broad and slightly bowed forward from clypeal plane; vibrissae on oral margin, strong, decussate; frontals in a single row, two bristles beneath antennal base; two proclinate orbitals and two verticals; ocellars proclinate, divaricate; antennae reaching almost to oral margin, first segment short, third four or five times second, widened gradually from base to broad truncate tip; arista long, set far before base of third antennal segment, thickened on proximal three-fourths, middle segment over half length of third; cheek one-fourth eye height; eyes bare, reaching nearly to vibrissae; proboscis short, stout; palpi subequal length of haustellum, slender in male and with tips slightly thickened in female. Thoracic chaetotaxy: acrostichal 1, 1; dorsocentral 2, 3; humeral 2; posthumeral 1; notopleural 2; presutural 2 (inner small but distinct); intraalar 3; supraalar 3; postalar 2; intrapostalar strong; sternopleural 4 (intermediate two small); pteropleural 1 (weak); scutellum with 3 lateral (middle one small) and 1 weak discal pair, apicals reduced to minute hairs; prosternum bristled; propleura bare; postnotum beneath calypters bare. Abdomen ovate, about as wide as thorax; second segment with median marginals, last two each with marginal row; sternites covered. Legs sparsely, weakly bristled; tarsi elongate and slender, claws and pulvilli short in both sexes.

Wings ordinary in size and shape; first vein bare, third with one large and about two small hairs near base; first posterior cell narrowly open in extreme wing tip; bend of fourth vein without stump, close to hind margin of wing; hind cross vein perpendicular to fourth midway between bend and small cross vein; costal spine short.

Genotype: *Lispideosoma flavipes* n. sp.

Lispideosoma flavipes n. sp.

Female. Front at vertex 0.44 of head width, hardly any wider at antennal base; frontal vitta pollinose, reddish yellow, at middle wider than parafrontal; latter with thick dull cinereous pollen, which extends downward on face, parafacials and cheeks; basal antennal segments yellow, third blackish, its length less than twice apical width; arista longer than antennae, reddish, basal segment longish; parafacial narrowed downward, with a median row of short hairs extending from lowest frontals to lower edge of eye; cheeks beset with rather coarse hairs; haustellum and labella yellow, latter moderately large and fleshy; palpi yellow; back of head slightly convex, densely gray pollinose, clothed with sparse, short, black hairs.

Thorax black with reddish tinge in ground color of pleura, humeri and apex of scutellum, wholly cinereous pollinose; notum without trace of dorsal vittae, calypters semitransparent, white with faint tawny tinge.

Abdomen black, wholly covered with heavy lusterless cinereous pollen, genitalia retracted, blunt-tipped, ventro-caudal.

Legs reddish yellow to tarsi, latter blackish, moderately slender including apical segment; claws and pulvilli small; hind tibiae not ciliate.

Wings nearly hyaline; veins including costal yellow; epaulet red, subepaulet pale yellow.

Male. Front at vertex 0.41 of head width, only a trifle wider at antennal base; proclinate orbitals rather weak; third antennal segment and arista blackish, latter not longer than antennae and set near middle of third segment; thorax and scutellum wholly black in ground color; abdomen narrower than in female, with moderately large genital segments curved beneath apex; forceps short, outer pair broadish at base, terminating in a curved delicate finger-like process; inner pair blackish, united and hardly tapered apically, rather thin in profile with a small process near middle in front, which is bowed rearward toward apex of forceps; tarsi more slender, claws and pulvilli still smaller than in female.

Length: male, 5 mm.; female, 6.5 mm.

Holotype: female, Dane Co., Wisconsin, September 13, 1927. *Allotype*: male, labeled "Wisconsin, July 7, 1934".

Psilopleura n. gen.

Allied to *Goniochaeta,* but the pteropleural bristle vestigial; face rather deeply impressed, with parafacial equal clypeal width; last section of fifth vein but slightly longer than preceding section.

Female. Head about one-third wider than high, facial profile moderately receding and little longer than frontal, oral margin axis three-fifths antennal, which is slightly above eye middle; clypeus moderately sunk, rather narrow and nearly twice longer than broad; epistoma short, almost as wide as clypeus and slightly bowed forward from plane of same; vibrissae on oral margin; frontal rows converging toward antennae with one bristle beneath base of latter diverging from main row, curved upward and smaller than preceding bristle; verticals two pairs; ocellar triangle large, bearing a pair of good-sized divaricate bristles which vary from slightly reclinate to proclinate in the two available specimens; orbitals three proclinate pairs; antennae reaching nearly to oral

margin, basal segments short, second with a small but distinctly raised setose tubercle on front side near middle; third segment slender four to five times length of second; arista bare, much shorter than antennae, thickened beyond middle, second segment moderately long and gradually widened to apex; parafacial only slightly narrowed downward, with a row of weak infraclinate bristly hairs beginning near upper third at inner margin and diverging gradually downward to middle of parafacial on level with lower margin of eye and with some scattered minute hairs outside row but none extending close to eye margin; proboscis short, palpi barely thickened apically about as long as haustellum; cheek about one-third eye height; eyes bare. Thoracic chaetotaxy: acrostichal 3, 2 (none immediately behind suture); dorsocentral 3, 3; humeral 2-3; posthumeral 1; notopleural 2; presutural 1 (outer); intraalar 2 (anterior one vestigial); supraalar 3 (only median one large); postalar 2; hypopleural 5-7; sternopleural 2, 1; pteropleural 1 (small or hairlike); scutellum with 2 strong lateral and 1 good-sized decussate apical pair besides 1 unpaired small preapical bristle; no well developed discals; prosternum and sides of postnotum beneath calypters bare; propleura sparsely haired; infrascutellum well developed. Abdomen long ovate barely equal maximum thoracic width; basal segments each with one pair of median marginal bristles, third with marginal row, fourth with discal and marginal row; genitalia retracted, not adapted for piercing; sternites covered. Legs moderately stout, hind tibiae not ciliated, claws and pulvilli short. Wings rather short, with costal border slightly emarginate beyond apex of second vein; first, third and fifth veins setulose; hind cross vein strongly retracted, joining fourth about two-fifths distance from small cross vein to bend; first posterior cell narrowly open far before wing tip; bend of fourth vein with short, sometimes indistinct fold; costal spine vestigial.

Genotype: *Psilopleura arida* n. sp.

Psilopleura arida n. sp.

Female. Front at vertex 0.37 and 0.46 of head width (in two specimens), hardly any wider at antennal base; parafrontals, parafacials and cheeks gray to silvery pollinose; frontal vitta dark red, divided on upper half by ocellar triangle with the diverging prongs extending to vertex, width at middle narrower than parafrontal; antennae black with a reddish tinge in ground color of basal segments; arista black, evenly tapered to near tip, proximal segments very short; cheek reddish in ground color, with a few short hairs along lower border; palpi dark brown or blackish, bearing two or three longish hairs on lower edge near tip; back of head rather flat and sparsely clothed with whitish hairs.

Thorax and scutellum black with moderately thick gray pollen which is interrupted on notum by four dark vittae not well defined behind suture; calypters white, hind lobes distinctly broader than long.

Abdomen black, moderately shiny, with silvery pollen on basal half or less of last three segments; venter wholly shining black without any pollen.

Legs black; middle tibia with two stoutish bristles on outer front side near middle; claws and pulvilli distinctly less than one-half length of apical tarsal segment. Wings hyaline; first vein setulose on entire length, third far beyond small cross vein and fifth near base only; last section of fifth vein barely one and one-fourth times length of preceding; epaulets black.

Length, 6-6.5 mm.

Holotype: Salt Lake City, Utah, June 15, 1937 (G. F. Knowlton). *Paratype*: one female, "Bernalillo County, New Mexico, July 5, 1921", without collector's label.

Gueriniopsis n. gen.

Allied to *Guerinia*, but more compact in build, frontal bristles descending only slightly below aristal level; facial ridges bristled on lower two-thirds to three-fourths; abdomen without discals on intermediate segments. Other differences are mentioned below.

Head nearly one-third wider than high, facial profile moderately receding and about one-fourth longer than frontal; vibrissal axis almost on oral margin, about three-fourths antennal, which is well above eye middle; face rather deeply impressed, gradually widening downward, lateral ridges bristled to upper fourth in male and to upper third in female; epistoma short, as wide as clypeus and slightly bowed forward from plane of same; frontals strong, two or three bristles beneath antennal base and moderately divergent from main row; two pairs of verticals developed in both sexes but proclinate orbitals lacking in male; ocellars large, proclinate; antennae nearly as long as face, first segment moderately short, third segment rather wide, barely exceeding twice length of second in female but almost four times same in male; arista elongate, bare, proximal segments short; parafacial bare, slightly narrowed downward, about one-half clypeal width; vibrissae stout, decussate; eyes bare; cheek sparsely haired, about one-fifth eye height; proboscis short, labella fleshy; palpi slender and moderately thickened apically. Thoracic chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; humeral 4-5; posthumeral 2; notopleural 2; presutural 2; intraalar 3; supraalar 3; postalar 3; intrapostalar well developed; sternopleural 2, 1; pteropleural 1 (smaller than sternopleural); scutellum with 3 lateral, 1 decussate apical and 1 discal pair; prosternum haired; propleura and sides of postnotum beneath calypters bare; infrascutellum normally developed. Abdomen as wide as thorax but somewhat pointed apically in male; basal segments with one pair of strong median marginals, last two with a marginal row besides a discal row on anal segment; sternites covered. Legs moderately stout; hind tibiae not ciliated; claws and pulvilli elongate in male, short in female. Wings extending slightly beyond apex of abdomen, normal in shape; veins bare except third which bears two to five hairs near base; first posterior cell narrowly open to closed at costa far before wing tip; bend of fourth vein about opposite apex of second vein and about midway between same and hind wing margin; last section of fifth vein nearly one-half length of preceding; costal spine short.

Genotype: *Gueriniopsis plausilis* n. sp.

Gueriniopsis plausilis n. sp.

Male. Front rather broad, at vertex 0.37 of head width and widening to about one-half of same at antennal base; parafrontal with gray pollen sometimes showing a distinct yellowish tinge, its width at middle equal vitta; antennae black with basal segments usually more or less reddish, third segment subequal parafacial width and three to four times longer than second; arista moderately thickened on basal third and slender beyond, blackish; parafacial and cheek gray pollinose; vibrissae near oral margin; palpi yellow; back of head gray pollinose and rather thickly clothed with pale hairs.

Thorax black, gray pollinose, notum with four narrow dark vittae before suture and five behind, scutellum sometimes with a slight reddish tinge in ground color near apex; calypters white.

Abdomen black with sides sometimes obscurely reddish, last three segments with gray pollen which extends thinly to hind margin on each and is sharply divided on median line changing from light to dark when viewed at opposite angles; genitalia retracted, blackish; inner forceps united and rather sharply narrowed at middle to a slender shiny beak, the basal half behind flattened bearing a dense vestiture of upwardly directed brownish hairs; outer forceps shorter, tapering to blunt infuscated tips which bear a few long black hairs; fifth sternite with a deep median incision, lobes shiny black with sparse hairs.

Legs black; middle tibia with a row of uneven bristles on outer front side, two median one stout; claws and pulvilli equal or exceeding last tarsal segment.

Wings gray hyaline; veins yellowish; small cross vein far before apex of first; eqaulet and subepaulet blackish.

Female. Front at vertex 0.44 of head width widening but little to antennal base; parafrontals usually more yellowish than in male; two proclinate orbitals; bristles on facial ridges sometimes barely ascending to level of lowermost frontals; abdomen broader and more flattened above; genitalia retracted, not adapted for piercing; claws and pulvilli shorter than last tarsal segment.

Length, 8-11 mm.

Holotype male and *allotype* female, Aweme, Manitoba, Canada, May 29, 1925 (N. Criddle) in Canadian National Collection, Ottawa. *Paratypes*: 2 males and 1 female, same data and location as type; 6 males, Madison, Wisconsin, May 29, 1933; 1 male, Iowa, without precise locality, June 26, 1924; 1 female, Amherst, Ohio, June 23, 1937 (H. J. Reinhard).

Cacozelus n. gen.

An average-sized moderately shining blackish species, which belongs to Germariini. The unusually short front, large antennae, wide deeply excavated face, with frontal bristles descending well beneath middle of latter are peculiar characters, among others, of this genus.

Male. Head much wider than high, frontal profile flat barely sloped and one-fourth length of facial, latter subparallel to occipital; antennal axis high up or near level with upper margin of eye and barely exceeding one-half head height; vibrissae only a trifle above lower border of head, oral margin axis not much shorter than antennal; front narrowest at vertex and well over eye width, median vitta before triangle slightly wider than long; frontals rather weak and quite uniform in length, not decussate, about nine bristles beneath antennal base curved upward; facial ridges moderately divergent downward with weak bristles on lower extremity and hairs above these ascending almost to middle or slightly above lowermost frontal; verticals two pairs, inner erect and moderately stout; ocellar bristles proclinate; antennae about as long as face, proximal segments short, third uncommonly broad and elongate; arista bare, long and thickened nearly to tip, middle segment three or four times longer than wide; epistoma short, rather broad and slightly bowed forward from clypeal plane; eyes thickly long pilose, cheek about three-fifths eye height; proboscis short, labella large; palpi moderately long, slender. Thoracic chaetotaxy: acrostichal 3, 3 (one pair just before suture); dorsocentral 3, 4; humeral 4; posthumeral 2; presutural 1 (outer); notopleural 2; supraalar 3; intraalar 3; postalar 2; intrapostalar vestigial; hypopleural 6-8; sternopleural 1, 1; pteropleural 1 (longer than sternopleural); scutellum with laterals variable (3 on one side, 4 on other), 1 discal and 1 small decussate apical pair; prosternum, propleura and sides of postnotum beneath calypters bare; infrascutellum well developed. Abdomen long ovate, as wide as thorax and rather weakly bristled; intermediate segments each with two pairs of discals besides a median marginal pair on second and a marginal row on third segment; anal segment with irregular rows of discals behind middle and a marginal row of equally long bristles; genital segments rather large and beset with spiny hairs; sternites rather widely exposed apically. Legs moderately long; hind tibia not ciliated; claws and pulvilli short. Wings ordinary in shape, extending slightly beyond apex of abdomen; first vein bare, third with about six minute hairs extending from near base almost halfway to small cross vein; bend of fourth vein with short stump; first posterior cell closed at costa well before wing tip; hind cross vein joining fourth about one-third distance from bend to small cross vein; last section of fifth vein short; costal spine vestigial.

Genotype: *Cacozelus riederi* n. sp.

Cacozelus riederi n. sp.

Male. Front at vertex 0.35 of head width, thence gradually wider to antennal base; sides of front and face black and slightly subshining with thin gray

pollen becoming denser on lower part of parafacial; frontal vitta dark reddish, very short and much wider than parafrontal; antennae black, basal segments short especially second which bears a stoutish bristle on front edge near middle; third segment nearly as long as face and its width subequal one-third length, rather striking; arista black, evenly tapered to tip, basal segment hardly longer than wide; cheek rather thickly haired, blacker and more shining than parafacial or parafrontal; cheek groove reddish; palpi reddish yellow, with several long black hairs on lower side; back of head black, thinly gray pollinose, rather thickly clothed with pale or whitish hairs.

Thorax and scutellum black, lightly dusted with gray pollen, notum moderately shining, with four vague vittae before suture apparent in a flat rear view; calypters white.

Abdomen polished black, last three segments dusted with changeable silvery pollen which appears denser on narrow basal margin of segments two and three except on median line, venter shiny, without any pollen; fifth sternite with a shallow median notch, lobes slightly prolonged on inner apical extremity; first genital segment highly polished, convex behind and rather thickly clothed with backwardly directed bristly hairs; second genital segment considerably smaller, not so shiny but also convex behind, with a sparser vestiture of finer black hairs.

Legs black, with only moderately strong bristles, middle tibia bearing three or four on outer front side; claws and pulvilli about one-half length of apical tarsal segment.

Wings gray hyaline with a slight brownish tinge at extreme base and along costal margin to apex of first vein; bend of fourth vein rectangular thence rather evenly concave to tip; epaulets and subepaulets black.

Length, 9 mm.

Holotype: male, Breitenbush Lake, Marion County, Oregon, June 23, 1940, collected by R. E. Rieder, for whom the species is named. I am indebted to Mr. Rieder for donating this interesting species to my collection.

FURTHER NOTES ON *EXENTERUS* (HYMENOPTERA, ICHNEUMONIDAE)

BY R. A. CUSHMAN,

Bureau of Entomology and Plant Quarantine, Washington, D. C.

Since the publication of my revision of the genus *Exenterus* (U. S. Dept. Agr. Misc. Pub. No. 354, 1940) several pertinent items of interest have come to my attention.

From the Canadian Department of Agriculture, through G. Stuart Walley, I have received specimens of two undescribed species, one in considerable numbers, the other represented by only a single specimen. The form of the hypopygium in the female type of *affinis* Rohwer, which I had mistaken for an abnormality, is shown by the more abundant of the two undescribed species to be the normal form for these two species. With *affinis* I had identified two females in the United States National Museum with the hypopygium of quite different, and what I assumed to be the normal, form. Those two, together with another received from Mr. Walley, constitute the type series of a second new species.

The marked difference in the two types of female hypopygium has led to an examination of that structure in both sexes and of the male genitalia in three of the four species under consideration as well as of some of the other species. So far as I am able to determine, the male genitalia furnish no diagnostic characters. The hypopygium, while not constant in form, appears to be sufficiently so to serve as an aid to identification. The figures* represent what appears to be the normal form for each of the three species represented by that sex.

The following partial key is to be substituted for couplet 2 of the key to species in my review of the genus cited above.

2. Scutellum less roughly sculptured and more shining apically than discally.

Female: Hypopygium (fig. 1, *a*), with apex thick, inflexed and deeply emarginate, surface with short, dense, erect, velvety pile; ovipositor sheath (fig. 1, *a*) in profile subtriangular and subacute. *Male*: Face entirely yellow or rarely pale brownish medially, hypopygium (figs. 2, *a* and 2, *b*) with apical margin rather evenly curved on each side from a median emargination to basal lateral angle.

Hind coxa ventrally and basal joint of hind trochanter entirely, and anterior margin of pronotum throughout, yellow; antenna in female hardly as long as abdomen, joints beyond middle definitely thicker than long; hypopygium in male (fig. 2, *a*) more evenly curved apically, not at all sinuate; apices of propodeum and metapleuron in female broadly reddish ..... *walleyi* n. sp.

Hind coxa entirely and basal joint of hind trochanter partly black; anterior margin of pronotum not yellow throughout; antenna in female fully as long as abdomen, joints beyond middle quadrate; hypopygium in male (fig. 2, *b*) with apical margin somewhat sinuate; propodeum and metapleuron in female not at all red ..... *affinis* Rohwer.

Scutellum evenly sculptured and dull all over. *Female*: Hypopygium (figs. 1, *b* and 1, *c*) with apex thin, flat, and entire, pubescence sparser and recumbent; ovipositor sheath (figs. 1, *b*, and 1, *c*) more rounded and blunter at apex. *Male* (of *diprionis*): Face with a broad black stripe medially; hypopygium (fig. 2, *c*) with apical margin more nearly straight on each side of middle and turning abruptly back on each side to basal angle.

Female: Apical margin of hypopygium (fig. 1, *b*) very broadly curved and frequently faintly emarginate medially; yellow markings very large, the pronotum with anterior margin broadly yellow throughout; antenna shorter than abdomen, joints beyond middle definitely thicker than long, basal two or three joints of flagellum yellow; basal joint of hind trochanter partly and apical joint entirely yellow. *Male*: Antenna much longer than in female and yellow markings much reduced ..... *diprionis* Rohwer.

Female: Apical margin of hypopygium (fig. 1, *c*) sharply curved, not at all emarginate; yellow markings small, the pronotum with anterior margin not yellow throughout; antenna as long as abdomen, joints beyond middle quadrate, flagellum black at base; basal joint of hind trochanter entirely and apical joint largely black. *Male*: Unknown ..... *platypes* n. sp.

---

*The drawings for figure 1 were made by Arthur D. Cushman, and those for figure 2 by Mary F. Benson.

Exenterus affinis Rohwer.
Fig. 2, *b*.

Examination of males associated with females by rearing and received from Mr. Walley shows that the three males which I had assigned to the species are misplaced and really belong to *diprionis* Rohwer. These are the specimens from Biscotasing, Ont., Quebec, and Mt. Desert, Maine, the last erroneously recorded as a female. With the elimination of these and of the two females here referred to *platypes* Cush., the specimens of *affinis* known to me are as follows: In the National Museum, the type and the female from Lincoln, Maine; and from the Canadian National Museum, the female from Mattawa, Ont., one female and two males reared by C. E. Atwood from *Neodiprion* sp. at Laniel, Quebec, June 19-26, 1940, under Exp. No. 12140, and one male reared from *Neodiprion abietis* (Harris) under F. I. Survey No. 3856E.

The male differs from the female virtually only in the secondary sexual characters of longer antennae and smaller yellow markings. From the male of its nearest relative, *walleyi* Cush., it is distinguished by the entirely black hind coxae and the slightly sinuate apical margin of the hypopygium.

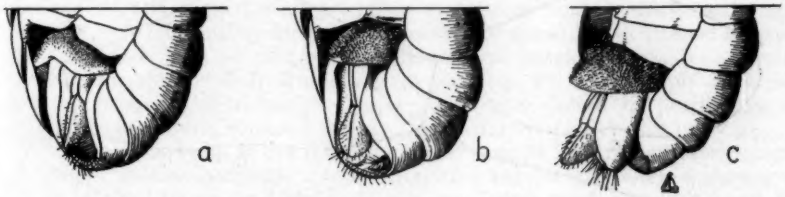


Fig. 1. Apex of abdomen of female in (*a*) *Exenterus walleyi* Cushman, (*b*) *E. diprionis* Rohwer, and (*c*) *E. platypes* Cushman. To show hypopygium and ovipositor sheath.

Exenterus walleyi n. sp.
Figs. 1, *a*, and 2, *a*.

In the form of the female hypopygium and tarsi and of the male hypopygium most closely related to *affinis* Rohwer, and in length of female antennae and color pattern, to *diprionis* Rohwer. From these two species it is readily distinguished by the characters employed in the key.

Female (holotype). Length 8.0 mm., antenna 4.5 mm. Head virtually as broad behind as through eyes, temples strongly convex; inner margins of eyes shallowly concave; clypeus half as long as broad, not transversely impressed apically, its basal and apical margins about equally curved; malar space hardly half as long as basal width of mandible; upper tooth of mandible slightly longer than lower tooth; antenna 32-jointed, as long as abdomen, joints beyond middle as long as broad.

Thorax densely and rather finely punctate, metapleuron somewhat more finely so than adjacent areas, propodeum rugose, especially in middle toward base, scutellum apically sparsely punctate and shining; costulae absent; tarsi strongly flattened, claws pectinate (3 or 4 stout teeth); nervellus inclivous, broken just above lower third.

Abdomen stout, broader than thorax, basal two tergites coarsely rugosopunctate, others finely and densely punctate; tergite 1 as long as broad, tergite 2 twice as broad basally as long medially; hypopygium deeply emarginate and inflexed apically, its surface with short, erect, velvety pile; ovipositor sheath in profile subtriangular, apex subacute, in ventral view tapering slightly, not bulbous.

Black, with yellow markings larger than in *affinis*, smaller than in *diprionis*, as follows: Face, frontal orbits to lateral ocelli, posterior orbits narrowing above, clypeus, mandibles, a sagittate spot on frons, under side of scape,

pedicel and basal joints of flagellum, broad anterior margin of pronotum and a spot on each side above the scrobe, a triangular spot on each antero-lateral margin of mesoscutum tapering posteriorly and becoming reddish above the tegula, scutellum and a small spot on each carina, postscutellum, a large subtriangular spot anteriorly on mesopleuron extending narrowly downward on prepectus, a median spot on mesosternum posteriorly, subalar tubercle, a large spot on each side of propodeum in the angle formed by the apical and pleural carinae, broad apical margins of tergites 1–6 gradually decreasing in width from second to sixth, fore and middle legs except extreme bases of coxae and posterior surfaces of femora, ventral surface of hind coxa, trochanter entirely, and basal two-thirds of hind tibia; tegula reddish with base yellow; apex of metapleuron and of propodeum, mesepimeron, first tergite basally and laterally, and tergites beyond third laterally reddish; venter yellow, with small brown sternites; dark color of legs piceous, tarsi stramineous.

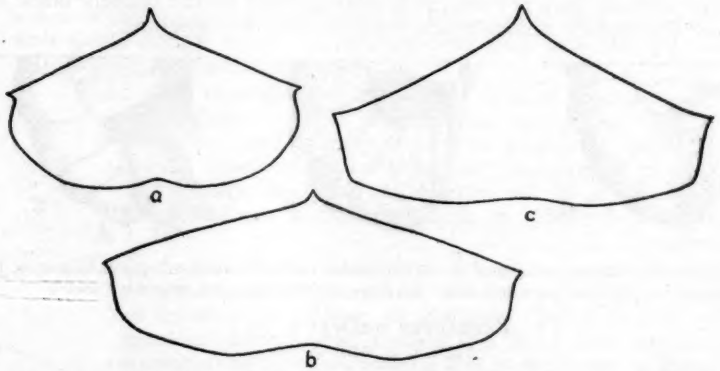


Fig. 2. Hypopygium of male in (*a*) *Exenterus walleyi* Cushman, (*b*) *E. affinis* Rohwer, and (*c*) *E. diprionis* Rohwer. Drawn from slide mounts.

Male (allotype). Length 7.0 mm., antenna 5.0 mm. Like female except in the usual sexual differences of more slender form and antennae and smaller yellow markings; the pronotal and mesosternal spots absent; red of propodeum, metapleuron, and abdomen less evident. Hypopygium apically almost evenly curved on each side from median emargination to basal lateral angle.

Type locality. Biscotasing, Ontario.

Holotype, allotype, and *paratypes.* No. 5410 in Canadian National Collection.

Paratypes. No. 56465, United States National Museum and coll. H. K. Townes. Twenty females and 3 males, all reared indoors out of season and all, except as noted, parasitic on *Neodiprion nanulus* Schedl, as follows: 10 females and 3 males, including holotype and allotype, from Biscotasing, Oct., F. I. Survey Rec. 7567; 5 females from Fort Frances, Ont., F. I. Survey Rec. 7348; 1 female from Hawk Lake, Ont., F. I. Survey Rec. 7473; 1 female from Rainy Lake, Ont., F. I. Survey Rec. 7108; 2 females from Timagami, Ont., reared from *Neodiprion abietis* (Harris), F. I. Survey Rec. 7130; and 1 female from Fredericton, N. B., reared (host not given) by R. E. Balch under his No. 18755-62.

Within the series there is some variation in size (7-9 mm.), in the size of maculations and extent of red color, and in the darker color of the legs, some females having the hind femur almost red. In the allotype and one of the male paratypes the yellow bands on the first two tergites are interrupted medially.

Exenterus diprionis Rohwer
Figs. 1, *b*, and 2, *c*.

The very short antennae and the apically very thin and broadly arcuate hypopygium of the female distinguish that sex of this species at once from any of the other species with flattened tarsi, while the laterally sharply angled hypopygium will distinguish the male from those of *affinis* and *walleyi*. From all but *walleyi* the female is also easily distinguishable by its much more extensive yellow pattern, and from that species by the lack of red on the metapleuron and abdomen and the more uniform sculpture of the scutellum.

Exenterus platypes n. sp.
Fig. 1, *c*.

Similar in form and vestiture of female hypopygium, form of ovipositor sheath, and sculpture of scutellum to *diprionis* Rohwer, and to *affinis* Rohwer in length of antenna and size of yellow markings.

Female (holotype). Length 9.0 mm., antenna 5.0 mm.

Structurally similar in most respects to *walleyi* as described above, but antennae slightly longer, with all joints at least as long as thick, malar space distinctly less than half as long as basal width of mandible, sculpture somewhat finer, especially that of base of propodeum and basal two tergites, scutellum densely punctate and dull throughout; hypopgium flat and sharply rounded at apex, its surface with recumbent hairs; ovipositor sheath in profile not subtriangular but bluntly rounded at apex, in ventral view thick and bulbous.

Yellow markings as described for *walleyi* except much smaller, mesosternal spot absent, yellow marginal band of pronotum narrow and interrupted on each side of middle; thorax and abdomen not at all red; hind coxa and basal joint of trochanter entirely black, second joint partly so, and legs generally darker; hypopygium brown.

Type locality. Probably Osage, Minn.

Holotype and *paratype*. No 56466, United States National Museum.

Paratype. No. 5411 in Canadian National Collection.

Three females as follows: The holotype labelled "Hopkins U. S. No. 17501r, S. A. Graham, 7-25-25," which probably indicates that it was reared, together with a considerable series of *Exenterus canadensis* (Prov.), from *Neodiprion banksianae* Rohwer at Osage, Minn.; 1 reared from a "sawfly on pine" at Weaverville, N. C., by E. V. Harbeck; and one in the Canadian National Collection from Richan, Ont., reared in incubator, April 2, 1939, from *Neodiprion banksianae* Roh., F. I. Survey Rec. 3904. The first two are recorded in my revision under *E. affinis*.

In this small series the variation is negligible.

Exenterus canadensis (Provancher)

Mr. Walley also sent me a large series of specimens showing virtually all gradations in variation between this species and *E. flavissimus* Cushman. I have examined this series in detail and am forced to express my conclusions thus:

(*Exenterus flavissimus* Cush.) = *Exenterus canadensis* (Prov.). *New synonymy.*

Exenterus amictorius (Panzer), *new combination*.

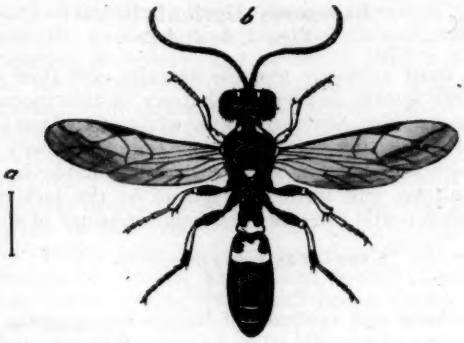
Ichneumon marginatorius Fabricius, Ent. Syst. 2: 145, 1793, (Preoccupied by *Ichneumon marginatorius* Rossi, 1790.)

Ichneumon amictorius Panzer, Faun. Insect. German. 7, pt. 80: pl. 14, 1801.

Exenterus marginatorius (Fabricius): Hartig, Jahresber. Fortschr. Forstw. 1: 270, 1838; Cushman, U. S. Dept. Agr. Misc. Pub. 354: 8, 1940.

For additional literature citations see Dalla Torre, *Catalogus Hymenopterorum*, and the Cushman paper cited above.

Because of the prior use of the combination *Ichneumon marginatorius*



Ichneumon amictorius Mihi.

J. St. fec

ICHNEVMON amictorius.

Die ſchwarze gelbgeflecht und geringelte Schlupfweſpe.

Ichneumon amictorius: ſcutello lineolaque ſub ſcutello flavis, thorace maculato niger, abdomine ſegmento ſecundo tertio macula dorſali, ultimis margine flavis.

Habitat Norimbergae. *Dn. Sturm.*

Medius. Caput maiuſculum atrum pubeſcens, orbita antica, fronte, labio, palpisque flavis. Antennae nigrae ſubtus rufeſcentes. Oculi fuſci. Thorax ater, lineola antica, duobus aliis baſeos, puncto ſub alis, et alio calloſo ante alas, ſcutello, lineolaque ſub ſcutello flavis. Abdomen ſubpetiolatum, ſegmento primo et ſecundo macula dorſali flavis, tertio quarto immaculatis, reliquis poſtice flavo marginatis. Tibiae quatuor anticae flavae, poſticae apice annulo nigro: femora quatuor poſtica nigra: tarſis poſtis fuſcis. Alae fuſceſcentes, apice hyalinae, puncto marginali craſſiori ſubflavo.

a Magnitudo naturalis. b Eadem aucta.

14

Fig. 3. Original description and figure of *Exenterus amictorius* (Panzer). Reproduced in exact size.

by Rossi for a different insect, it is necessary to use for this species the next oldest available name, *amictorius* Panzer. Comparison of Panzer's description and figure with Fabricius' original description of *marginatorius* leaves no question that they apply to the same insect. Panzer's plate of *amictorius* is reproduced in actual size herewith.

In *Systema Piezatorum* the basal two segments of the abdomen of *marginatorius* are described as fuscous, "fascia" of the original description being misprinted "fuscis."

A REMARKABLE INSTANCE OF RETENTION OF A DOUBLE SPERMATHECA IN A DOLICHOPSYLLID FLEA, *OPISOCROSTIS BRUNERI* (BAKER).*

BY GEORGE P. HOLLAND,
Livestock Insect Laboratory, Kamloops, B. C.

In some species of insects there is only a single mating, but the egg-laying period may extend over a considerable length of time. Under such circumstances there must be some provision in the female for the storage and preservation of the supply of seminal fluid received during coitus, so that spermatozoa will be available as eggs mature. This is generally effected by an organ known as the spermatheca or receptaculum seminis, a flask-like structure which may open by means of a duct directly into the vagina, but more frequently empties into a bursa copulatrix, which in turn opens into the vagina.

The spermatheca is highly variable in form, structure and size. According to Imms (1938) it is usually a single organ, but in certain Coleoptera it may be double, and in a few families of Diptera (e. g. Tabanidae) there may even be three.

In the Siphonaptera or fleas, there is generally but one, although a vestigial blind duct leading into the bursa copulatrix would indicate that ancestrally it was a paired structure, the blind duct being all that is left of the second ductus receptaculi seminis. This is the case in six of the seven families of Siphonaptera recognized in North America (classification used by Jellison and Good, 1942). However, in two genera of the seventh family, *Atyphloceras* and *Hystrichopsylla*, the double organ is still retained, and two spermathecae of equal size and similar shape join the bursa copulatrix by separate ducts. The remaining genera in this family, Hystrichopsyllidae, have but one spermatheca.

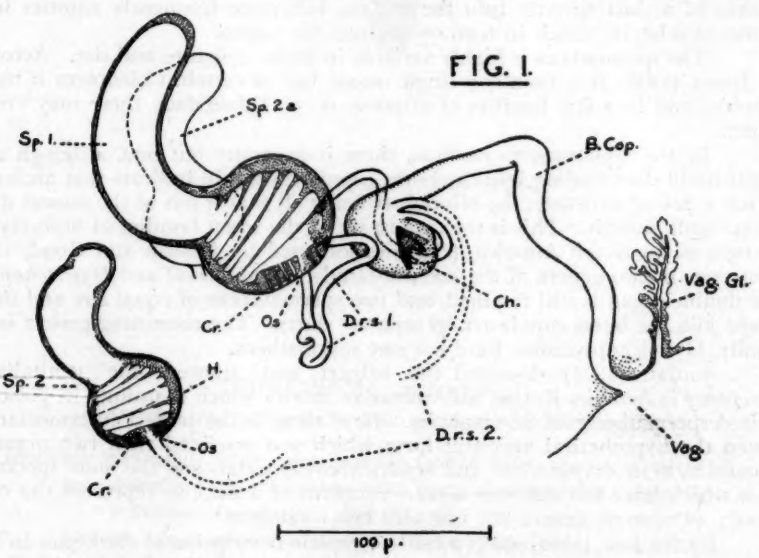
Jordan (1921) discussed the subject and figured the genitalia of *Macropsylla hercules* Roths., an Australian species which is unique in possessing paired spermathecae of unequal size. Here then, is the perfect intermediate between the hypothetical ancestral form which was provided with two organs of equal size, as in *Atyphloceras* and *Hystrichopsylla* today, and the more specialized fleas which have but one and a mere remnant of a duct to represent the other. Nearly 70 nearctic genera fall into this latter category.

Carrol Fox (1914) gives a fairly complete description of the organ in fleas, and describes its function and accessory structures. He figures the female genitalia, and especially the spermatheca of a number of fleas, mostly nearctic species. He points out that the rudimentary duct (ductus obturatorius) in fleas with the single spermatheca may be variously developed in the different species, or even entirely absent. For instance, in *Ceratophyllus* (now *Nosopsyllus*) *fasciatus* (Bosc) it is very short, and by way of contrast in *Ceratophyllus* (now *Opisocrostis*) *bruneri* (Baker) it is almost as long as the ductus receptaculi seminis. Sometimes it is partly chitinized.

Fox's note on the considerable development of the ductus obturatorius in *Opisocrostis bruneri* is of special interest in view of the discovery of a specimen of this species in the collection at the Livestock Insect Laboratory at Kamloops, which has in some measure reverted to its ancestral form. This specimen, along with three males of the same species, was collected at Blackfalds, Alberta, June 6, 1941, from a striped ground squirrel, *Citellus tridecemlineatus* ssp., by Mrs. C. Elwell. It has, in addition to its regular spermatheca of normal size and shape, an additional organ of somewhat smaller size but of much the same shape except for a very slight distortion near the tip of the tail. Unfortunately, for the purpose of tracing out the relationships and comparative development of the ducts, the action of the KOH used in the process of clearing the specimen has dissolved away much of these softer tissues. The duct of the smaller spermatheca has

*Contribution No. 2232, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

almost entirely disappeared, although the duct of the larger one is faintly discernible (fig. 1). The small spermatheca, freed from its duct, has taken up a position directly under the large one, or more correctly, on the right side, as fleas are examined laterally. In the diagram the actual position of the smaller organ is shown in outline (Sp. 2a), and the details of its structure shown below (Sp. 2). This additional organ may have been functional. It seems complete, with chitinous thickenings in the head portion (H.); the cribiform area (Cr.) and os (Os.) are readily discernible. Its duct (D.r.s.2.) is represented in dotted outline to the point where an actual portion of it was observed to join the bursa copulatrix, beside the entrance of the ductus receptaculi seminis (D.r.s.1.) of the larger organ. This latter duct is slightly convoluted, as shown in the figure. A



Retention of a double spermatheca in *Opisocrostis bruneri* (Baker).

small chitinous reinforcement (Ch.), shaped like an arrowhead, is present in the head of the bursa copulatrix. The passage of the bursa copulatrix to the vagina (Vag.) and the location of the vaginal gland (Vag. Gl.) are also shown.

This "throwback" is the more remarkable in view of its occurrence in a species of the Dolichopsyllidae, which is one of the most advanced and highly specialized families of Siphonaptera. According to the classification of most authors, the Dolichopsyllidae is not placed in the same sub-order as the Hystrichopsyllidae, which is the only North American family having certain genera and species retaining the double spermatheca as normal structures.

LITERATURE CITED

1. Fox, Carrol, 1914. The taxonomic value of the copulatory organs of the females in the order Siphonaptera. U. S. Public Health Hyg. Lab., Bul. 97, p. 19-25; pls. 6-22.

2. Imms, A. D., 1938. Textbook of Entomology, 4th ed., Methuen, London.

3. Jellison, Wm. L., & Newell E. Good, 1942. Index to the literature of Siphonaptera in North America. Nat. Inst. Health Bul. 178, p. 1-191.

4. Jordon, K., 1921. A link between the double and single receptacula seminis of Siphonaptera. Ectoparasites 1 (3): 127-128, fig. 104.

NOTES ON SOME FLEAS OF NEW YORK STATE*

E. W. JAMESON, JR.,

Cornell University, Ithaca, New York.

During the course of field work with small mammals in central New York, the writer made a collection of fleas. Those records which give additional information on the host distribution of these parasites, are listed below. Some significant records from the Cornell University collection are also cited. This short list will serve to supplement the checklist of fleas for New York State of Stewart (1933, Jour. N. Y. Ent. Soc., 41:253-262). The availability of the Cornell collection was made through the kindness of Dr. Robert Matheson, and to him I tender my thanks.

ACCOUNT OF SPECIES

Opisodasys pseudarctomys (Baker). Three specimens were taken from a northern flying squirrel, *Glaucomys sabrinus macrotis* (Mearns) in Nine Mile Swamp in Madison County. Stewart (1933) also lists this flea as occurring on the northern flying squirrel, but he calls it *Glaucomys volans volans* (Linnaeus) which is a different species. One is left with a choice as to the species he meant as both of them are common in many places in New York. I have trapped both species of flying squirrels, but have taken this flea only from *Glaucomys sabrinus macrotis* (Mearns).

Atyphloceras bishopi Jordan. In 1933 Jordan described this flea from a short-tailed shrew from Fairport, New York. One specimen was taken from a meadow mouse at Elmira, and another was collected by W. J. Hamilton, Jr., from a red-backed mouse at Ithaca.

Nosopsyllus fasciatus (Bosc). This flea, commonly occurring on Norway rats, also parasitizes meadow mice when the two mammals occur in close proximity. A small series was collected at Ithaca from both rats and meadow mice.

Conorhinopsylla stanfordi Stewart. Specimens of this flea were taken from both the red squirrel and the small eastern flying squirrel at Ithaca.

Epitedia faceta (Rothschild). According to Ewing and Fox (Fleas of N. A., U. S. D. A. Misc. Pub. No. 500, 1943), there are no published records for this flea since Rothschild described the original pair in 1915. I have taken six specimens: four from red squirrels and two from small eastern flying squirrels at Ithaca. Two of these specimens are now in the Cornell collection.

Ctenophthalmus pseudagyrtes Baker.. Dr. W. J. Hamilton, Jr., took three specimens of this flea from a rock vole at Halcot Mountain in the Catskills.

Hystrichopsylla gigas tahavuana Jordan. Dr. F. R. Nevin collected a flea of this species from a star-nosed mole at Ithaca.

Peromyscopsylla catatina (Jordan). A series of this flea was taken from red-backed mice in Nine Mile Swamp in Madison County.

HOST INDEX FOR THE ABOVE RECORDS

Condylura cristata Linnaeus. Star-nosed mole.
Blarina brevicauda talpoides (Gapper). Short-tailed shrew.
Tamiasciurus hudsonicus loquax (Bangs). Red squirrel.
Glaucomys v. volans (Linnaeus). Small eastern flying squirrel.
Glaucomys sabrinus macrotis (Mearns). Northern flying squirrel.
Clethrionomys g. gapperi (Vigors). Red-backed mouse.
Microtis p. pennsylvanicus (Ord). Meadow mouse.
Microtis c. chrotorrhinus Miller. Rock vole.
Rattus norvegicus (Erxleben). Norway rat.

---

*A contribution from the Department of Entomology, Cornell University, Ithaca, New York.

NOTES

A CORRECTION

In a paper entitled "Some Butterflies of Southern Newfoundland with Descriptions of New Subspecies" (1935, Can. Ent. LXVII:82) I recorded the capture of *Polygonia comma* Harris (1842, Ins. Inj. Veg., 221) on that island. Three of the specimens were taken in the spring (June 23) and were apparently hibernators, while the fourth was taken in the summer (August 23). Since the publication of that paper three more specimens have been received from the same locality. They belong to the summer brood (August 5, 10 and September 12). Further study of the enlarged series shows that the original specimens were misdetermined. They are *Polygonia marsyas* Edwards (1870, Trans. Am. Ent. Soc., 3:16). There are three specimens of *marsyas* from Charlton, Ontario, in the collection of The American Museum of Natural History. They are the most eastern captures heretofore noted. *P. marsyas* also occurs in Manitoba.

Polygonia faunus Edwards (1862, Proc. Acad. Nat. Sci. Phil., 221) seems to be more common than *marsyas* in Newfoundland. In addition to the specimens referred to in the original paper, twelve additional specimens have been received (August 23-31, September 4-14, 1938). The specimen recorded by Gamble Geddes (1886, Can. Ent. XVIII:204) cannot be found in the Canadian National Collection, according to Mr. T. N. Freeman who kindly searched for it.

Cyril F. dos Passos,
Mendham, New Jersey.

AWARDS FOR RESEARCH ON CYCLES

The Foundation for the Study of Cycles, a non-profit organization created to foster, promote, and conduct scientific research in respect to rhythmic and periodic fluctuations in any branch of science, announces the offering of a medal to the person who, during 1943, publishes the book or paper that in the opinion of the judges is the most outstanding. In addition to awarding a medal, the Foundation will make awards to outstanding work in each branch of science. In these awards the judges will be assisted by the recommendation of an advisor appointed by a scientific society in the branch involved.

Entomologists are asked to forward to R. E. Balch, Dominion Entomological Laboratory, Fredericton, N. B., copies of, or references to, any publications in the field of entomology dealing with cycles which come to their attention. At the end of the year an attempt will be made to evaluate these so that the judges may be assisted in selecting the work most worthy of award. It is hoped in this way, also, to help build up the library of the Foundation.

The person who receives the medal and the persons who receive the awards will be elected Fellows of the Foundation.

Information regarding the Foundation for the Study of Cycles can be obtained from the Director, Dr. Edward R. Dewey, 400 W. 118th St., New York City.

GUELPH PRINTING SERVICE

Mailed Thursday, October 21, 1943.